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CLIMATE IN SOUTHERN TIBET

The climate of local areas in southern Tibet ranging from the shores of the Nam Tso in the north to the borders of eastern Nepal, Sikkim, Bhutan, and western NEFA in the south, and from the vicinity of Shekar Dzong in the west to Tsela Dzong in the east varies according to altitude and location within the complex Himalayan mountain system. Long cold winters, short cool summers, low annual precipitation and atmospheric humidity, and strong winds, however, are characteristic of the entire region. It is this wind rather than the cold temperatures or the rarified atmosphere, which makes life on the plateaus and in the exposed areas for any considerable period of time at high altitudes so uncomfortable. It has a cumulative nervous effect and in time becomes almost unbearable. The extremely low atmospheric humidity, especially in the fall, winter, and spring, causes excessive drying of the skin and face cracking. Infrequent bathing and the use of grease and other skin coatings are the solutions of the local population.

Available climatic statistics based on observations at Lhasa and Yatung have sufficient periods of record to make them reasonably reliable for the Kyi Chu and Chumbi valleys, respectively; descriptions of conditions for other areas are based on travellers' accounts and reports of a few scientific expeditions. Climate to some degree follows elevation above sea level, especially in the lower latitudes, and in southern Tibet the lower altitudes do enjoy milder temperatures and less severe climatic

extremes. The heights of surrounding mountain ranges also influence the amount of precipitation a given area receives. In the area under discussion four climatic variations are distinguished: 1) the area in the vicinity of the Nam Tso located on the eastern fringe of the vast Chang Thang of northern and central Tibet, 2) the Kyi Chu and central Tsangpo river valleys, 3) the Kongbo area and the Chumbi valley northeast of Sikkim, and 4) the plateau country south of the Tsangpo.

Low mean temperatures are characteristic of the Nam Tso area at all seasons of the year. Winter temperatures average below freezing with lows reaching zero and downwards to  $-40^{\circ}\text{F}$ . Summer is brief; it begins in June and ends the latter part of August. Heavy freezes occur in May and in some years ice still covers the Nam Tso in June. Wide variations between night and day temperatures are experienced. Frosts and even freezes at night in mid-summer are not unusual, while daytime highs can vary from  $68^{\circ}\text{F}$  or more in the sun to  $53^{\circ}\text{F}$  and lower in the shade. In spite of the relatively low temperatures, the sun is incredibly powerful on the Tibetan plateau due to the thinness of the atmosphere and the high altitude, and even a brief exposure can produce a painful sunburn. Without adequate protection from the reflected rays of the sun, an additional hazard is snow blindness. The light annual precipitation is concentrated in July and August falling mostly in the form of afternoon thunder showers, although sudden snow or hail storms are not uncommon. Even during the winter months the snow cover is not deep and rarely remains on the ground for more than a few days. A large part of it is swept away from the level expanses into depressions by the winds. Deep snows are found only on the high passes. The best weather

for travelling comes in fall and early winter. The ever present Tibetan winds are less fierce, the air is clear and dry, and the temperature is relatively even.

<sup>d</sup>Miller climatic conditions prevail in the Tsangpo and Kyi Chu Valleys. Statistics for Lhasa indicate that average monthly temperatures range from 31°F in January to 62°F in June with an average maximum in June of 76°F and an absolute minimum average of 5°F recorded in December. Temperatures in the more exposed Tsangpo valley probably average a few degrees lower than at Lhasa. Winters are dry with almost no precipitation; a few inconsequential snowfalls in January-March rarely remain on the ground for more than a half day, although occasional patches of snow cling to the upper slopes. The rains begin in June at the period of highest annual temperatures and continue through September reflecting the influence of the Indian monsoon. An annual precipitation of 12-15 inches is estimated for Gyantse in the Tsangpo valley and 25 inches is average for Lhasa. Southwest winds prevail at Lhasa, with occasional north winds in winter bringing severe cold; however, strong winds are less common in the protected Kyi Chu valley than along the Tsangpo where the full east-west sweep of the valley provides a funnel for strong winds racing up the valley bottom from the gaps in the Himalayas near the great bend of the Tsangpo.

East of Tsetang near Gyatsa the Tsangpo cuts through the Trans-Himalayan range, which provides a backstop for the moisture-laden monsoon winds that penetrate the Himalayan gaps and are responsible for the higher annual precipitation evidenced in the Kongbo area. Precipitation increases

from west to east and from north to south, with an annual range of from 20 to over 40 inches. Pitched-roof buildings replace the flat roofs of the more arid plateau regions and forest appear in the narrow valleys and canyons of tributary streams and along the northern slopes of the broader valleys. Elevations are lower, averaging 9,000-10,000 feet in the valleys and 2,000-3,000 feet higher on the encircling mountains; temperatures are higher approximating those for Lhasa; summers are longer, winters milder; and the Trans-Himalayan range cuts off the cold northern winds blowing from the highlands. As elsewhere in Tibet, late summer and fall are the preferred seasons for travel, although the other seasons of the year each present some advantageous travel conditions.

The Chumbi valley represents one of the most temperate regions in Tibet. The summers are delightfully cool and sunny with light breezes; average July temperatures range from 50°-66°F. Winter temperatures fall to an average of 25°F with an average absolute recorded minimum of -5°F. Precipitation decreases steadily from 150 inches at the Nathu La, the pass leading to Sikkim, to 35 inches at Yatung and 12-15 inches at Phari Dzong at the northern approach to the valley. Snow falls lightly on the Nathu La from October through January and heavily February through May. Snow cover in the valley seldom lingers more than a few days. The adequate moisture concentrated in the late spring and summer months helps provide a mantle of rhododendron, pine, and birch on the mountainsides. One traveller has noted the resemblance of the landscape to the Canadian Rockies in the vicinity of Mt. Assiniboine west of Banff.

South of the Tsangpo valley an upland plateau area with broad flat plains, wide valleys, and intermontane depressions that average 14,000 feet above sea level experiences climatic conditions akin to, but less severe than, those in the Nam Tso area. Most of the precipitation falls as rain in July and August, a lesser amount as snow from February through April. Above 13,500 feet snow up to 18 inches deep may lie on the ground for several days. The strong winds and dry, cold winters produce a desert-like landscape seemingly devoid of plant life, which only becomes visible on closer inspection hugging the sheltered places behind rocks and in crannies; but during the warm, moist summer months, the earth is covered by a blanket of wild steppe flowers. The clear thin atmosphere over the bare plains and hillsides causes optical illusions in human judgement of sizes and distances. The illusion is even greater over snow. The result is that objects, which appear sharp, clear, large, and almost within reach, are actually miles away.

Climatic factors have a strong influence on travel in Tibet. The best travel time is in the predawn and early morning hours of late summer and early fall. Aside from the concealment factor, this particular hourly timing offers several advantages: wind velocity is lower at night increasing to a peak in the afternoon, and the water level of fordable streams is down (daytime warmth melts snow and creates a larger amount of runoff and consequently higher water levels in afternoon and early evening). Seasonally, better forage is available for both man and beast, the bogs and swamps created by the summer rains are drained, and generally clear, dry, and relatively warm weather prevails. For as a Soviet authority describes

travel in Tibet: "During January, February and March the mountains are covered with snow and it is impossible to travel; during April, May and June the feet sink in the mud; in July, August and September -- hurry on your way, for it is the most favorable time; during October, November and December the skin cracks from the cold."

SELECTED CLIMATIC STATISTICS FOR  
LHASA AND YATUNG\*

Mean Monthly Temperatures (°F)

|        | <u>J</u> | <u>F</u> | <u>M</u> | <u>A</u> | <u>M</u> | <u>J</u>  | <u>J</u>  | <u>A</u> | <u>S</u> | <u>O</u> | <u>N</u> | <u>D</u> |
|--------|----------|----------|----------|----------|----------|-----------|-----------|----------|----------|----------|----------|----------|
| Lhasa  | 31       | 35       | 42       | 48       | 55       | <u>62</u> | 62        | 60       | 58       | 41       | 39       | 32       |
| Yatung | 41       | 27       | 31       | 41       | 49       | 55        | <u>56</u> | 56       | 53       | 42       | 30       | 25       |

Mean Maximum Temperatures (°F)

|        | <u>J</u> | <u>F</u> | <u>M</u> | <u>A</u> | <u>M</u> | <u>J</u> | <u>J</u> | <u>A</u> | <u>S</u> | <u>O</u> | <u>N</u> | <u>D</u> |
|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Lhasa  | 46       | 48       | 55       | 62       | 69       | 76       | 65       | 74       | 71       | 63       | 56       | 49       |
| Yatung | 46       | 48       | 56       | 58       | 62       | 64       | 65       | 65       | 63       | 59       | 55       | 49       |

Mean Minimum Temperatures (°F)

|        | <u>J</u> | <u>F</u> | <u>M</u> | <u>A</u> | <u>M</u> | <u>J</u> | <u>J</u> | <u>A</u> | <u>S</u> | <u>O</u> | <u>N</u> | <u>D</u> |
|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Lhasa  | 16       | 21       | 29       | 37       | 43       | 51       | 52       | 51       | 48       | 37       | 26       | 18       |
| Yatung | 16       | 20       | 26       | 32       | 41       | 47       | 51       | 50       | 47       | 36       | 26       | 45       |

Absolute Minimum Temperatures (°F)

|        | <u>J</u> | <u>F</u> | <u>M</u> | <u>A</u> | <u>M</u> | <u>J</u> | <u>J</u> | <u>A</u> | <u>S</u> | <u>O</u> | <u>N</u> | <u>D</u> |
|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Lhasa  | 7        | 8        | 15       | 20       | 28       | 41       | 44       | 42       | 36       | 24       | 15       | 5        |
| Yatung | -5       | 8        | 16       | 20       | 31       | 39       | 44       | 44       | 31       | 20       | 14       | 13       |

Number of Days Temperatures Below Freezing

|       | <u>J</u> | <u>A</u> | <u>S</u> | <u>O</u> | <u>N</u> | <u>D</u> | <u>J</u> | <u>F</u> | <u>M</u> | <u>A</u> | <u>M</u> | <u>J</u> |
|-------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Lhasa | 0        | 0        | 0        | 0        | 2        | 17       | 20       | 7        | 1        | 0        | 0        | 0        |

\* Lhasa 29°43'N, 91°02'E. Elevation approximately 11,998 feet.

Yatung 27°26'N, 88°53'E. Elevation approximately 9,950 feet.

Records are for periods of 5-11 years, except maximum snow accumulation for which statistics for only 2 years are available.

Amount of Precipitation (Inches)\*

|        | <u>J</u> | <u>F</u> | <u>M</u> | <u>A</u> | <u>M</u> | <u>J</u> | <u>J</u> | <u>A</u> | <u>S</u> | <u>O</u> | <u>N</u> | <u>D</u> | <u>Total</u> |
|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--------------|
| Lhasa  | .00      | .15      | .51      | .87      | 4.20     | 7.69     | 20.10    | 14.51    | 8.47     | .97      | .02      | .00      | 57.49        |
| Yatung | .41      | 2.06     | 1.53     | 4.13     | 4.16     | 5.00     | 5.23     | 6.37     | 4.74     | 2.63     | .26      | .31      | 36.83        |

Average Number of Days With Over  
0.1 Millimeter of Precipitation

|        | <u>J</u> | <u>F</u> | <u>M</u> | <u>A</u> | <u>M</u> | <u>J</u> | <u>J</u> | <u>A</u> | <u>S</u> | <u>O</u> | <u>N</u> | <u>D</u> |
|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Lhasa  | 0        | 1        | 2        | 4        | 9        | 12       | 19       | 19       | 14       | 4        | 0        | 0        |
| Yatung | 1        | 5        | 4        | 13       | 11       | 14       | 19       | 19       | 13       | 4        | 1        | 1        |

Maximum Snow Accumulation (Inches)

|       | <u>J</u> | <u>A</u> | <u>S</u> | <u>O</u> | <u>N</u> | <u>D</u> | <u>J</u> | <u>F</u> | <u>M</u> | <u>A</u> | <u>M</u> | <u>J</u> |
|-------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Lhasa | 0        | 0        | 0        | 0        | 0        | 1.18     | .19      | .39      | .94      | 1.18     | 0        | 0        |

Average Number of Clear Days

|       | <u>J</u> | <u>F</u> | <u>M</u> | <u>A</u> | <u>M</u> | <u>J</u> | <u>J</u> | <u>A</u> | <u>S</u> | <u>O</u> | <u>N</u> | <u>D</u> |
|-------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Lhasa | 15       | 10       | 5        | 5        | 3        | 3        | 2        | 2        | 5        | 15       | 20       | 21       |

Average Number of Cloudy Days

|       | <u>J</u> | <u>F</u> | <u>M</u> | <u>A</u> | <u>M</u> | <u>J</u> | <u>J</u> | <u>A</u> | <u>S</u> | <u>O</u> | <u>N</u> | <u>D</u> |
|-------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Lhasa | 3        | 4        | 6        | 9        | 9        | 12       | 20       | 17       | 11       | 5        | 1        | 1        |

\* The higher summer precipitation averages are the result of one year (1936) when reportedly 198 inches of rain fell. Obviously, this was exceptional. Based on records for other years, the normal amount of precipitation would be approximately 1 to 3 inches during May, June, and September, and from 3 to 10 inches during July and August, giving a yearly total of around 20 inches.

----- Statistics are from a climatic atlas of China published in Peking, 1960.